As a continuation of my methodology proposal to establish assistance levels on the Domane+ SLR 2023, today I want to share with you some results of information analysis that I have conducted to validate the theoretical values obtained with the methodology.

The theoretical assistance level values I obtained for my physical condition were as follows:

ECO: Max Power = 75 W, Assist = 112%, Response = Mid

MID: Max Power = 105 W, Assist = 112%, Response = Mid

HIGH: Max Power = 140 W, Assist = 200%, Response = Max

These values were established on 25/7/2023, and since then, 27 rides with different distances, altitudes, and durations have been completed. Over 1500 km of testing, more than 72 accumulated hours, and over 32,400 meters of cumulative ascent have been recorded. Each ride is documented with a GPX file captured from the TrekCentral app (27 files in total, containing over 7 million diverse data points).

With the assistance of AI and my programming skills, I have developed Python codes to model, process, understand, and approximate real results. The aim of this mathematical analysis is to verify, using real data (mega data), the degree of compliance with the assumptions considered in the theoretical methodology proposal for defining assistance levels. Since the developed program is fed with each new ride, after many loaded rides, we will gradually obtain a kind of "personal signature" showing our performance and that of the ebike in stable mode.

If you recall, my theoretical proposal correlates assistance levels with terrain slope levels, among other factors:

"SLOPE CRITERIA

Assistance Off (no assistance) when the route slope is negative range or from 0% to 3%.

ECO Level when the slope of the route is in the range of 3% to 7%.

MID Level when the slope of the route is in the range of 7% to 11%.

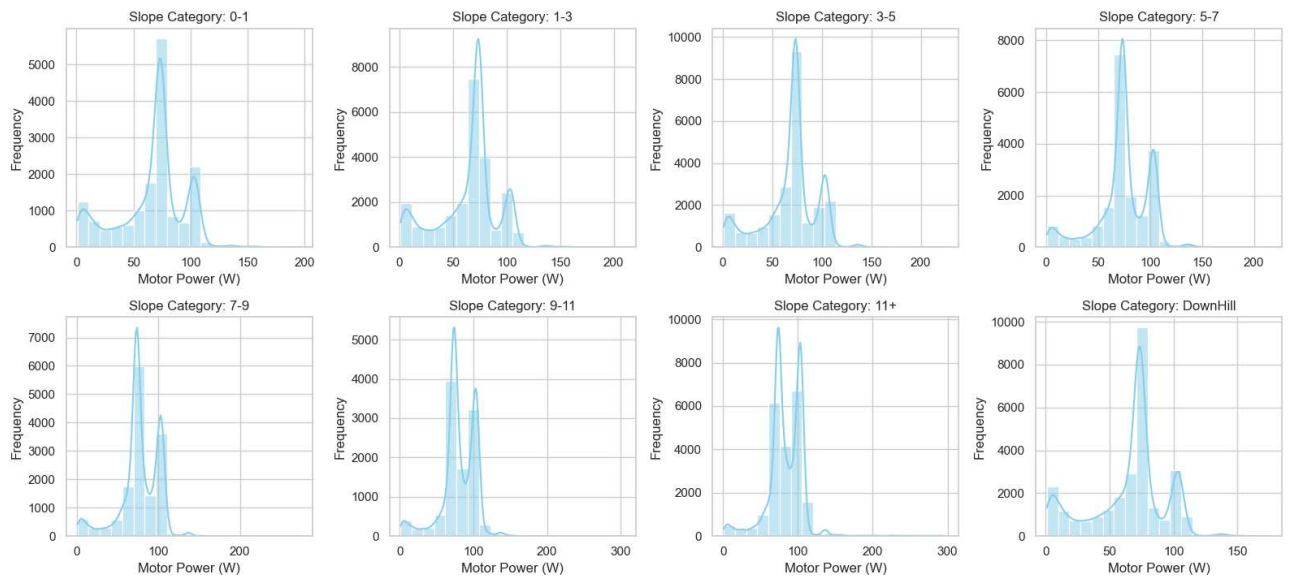*MAX Level when the slope of the route is in the range of 11% and above "*

In the processing of real information, the slope levels are analyzed in even finer ranges.

```
categories = ["0-1","1-3", "3-5", "5-7", "7-
9", "9-11", "11+", "DownHill"]
```

0 to 1 % ……….5 to 7% …… +11% , and DownHills

The following set of graphs shows the statistical distribution of motor power based on different ranges of terrain slope as per my assistance levels setting.
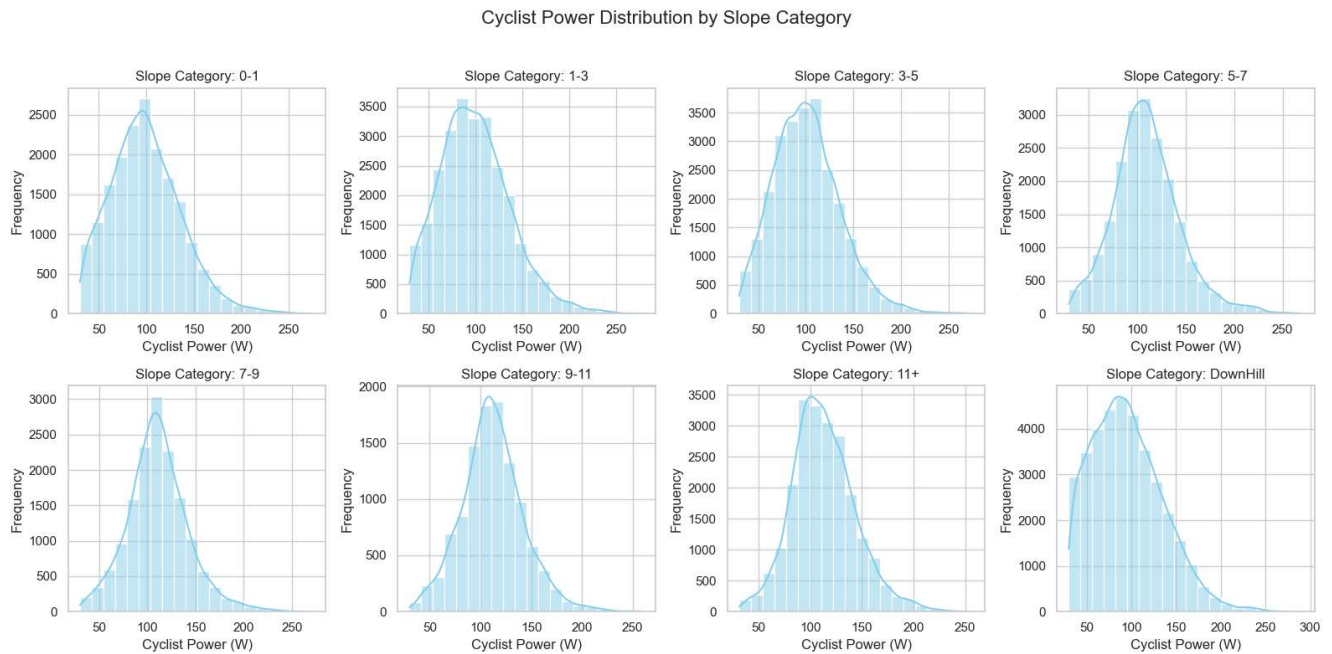
Motor Power Distribution by Slope Category

In terms of median, we can observe that, for instance, to tackle slopes of 5 to 7%, I have required an median assistance of 74 W. Similarly, you can see the averages for other slope levels.

```
Median of 'motor_power_0-1': 73.00 W
Median of 'motor_power_1-3': 72.00 W
Median of 'motor_power_3-5': 73.00 W
Median of 'motor_power_5-7': 74.00 W
Median of 'motor_power_7-9': 75.00 W
Median of 'motor_power_9-11': 77.00 W
Median of 'motor_power_11+': 82.00 W
Median of 'motor_power_DownHill': 72.00 W
```
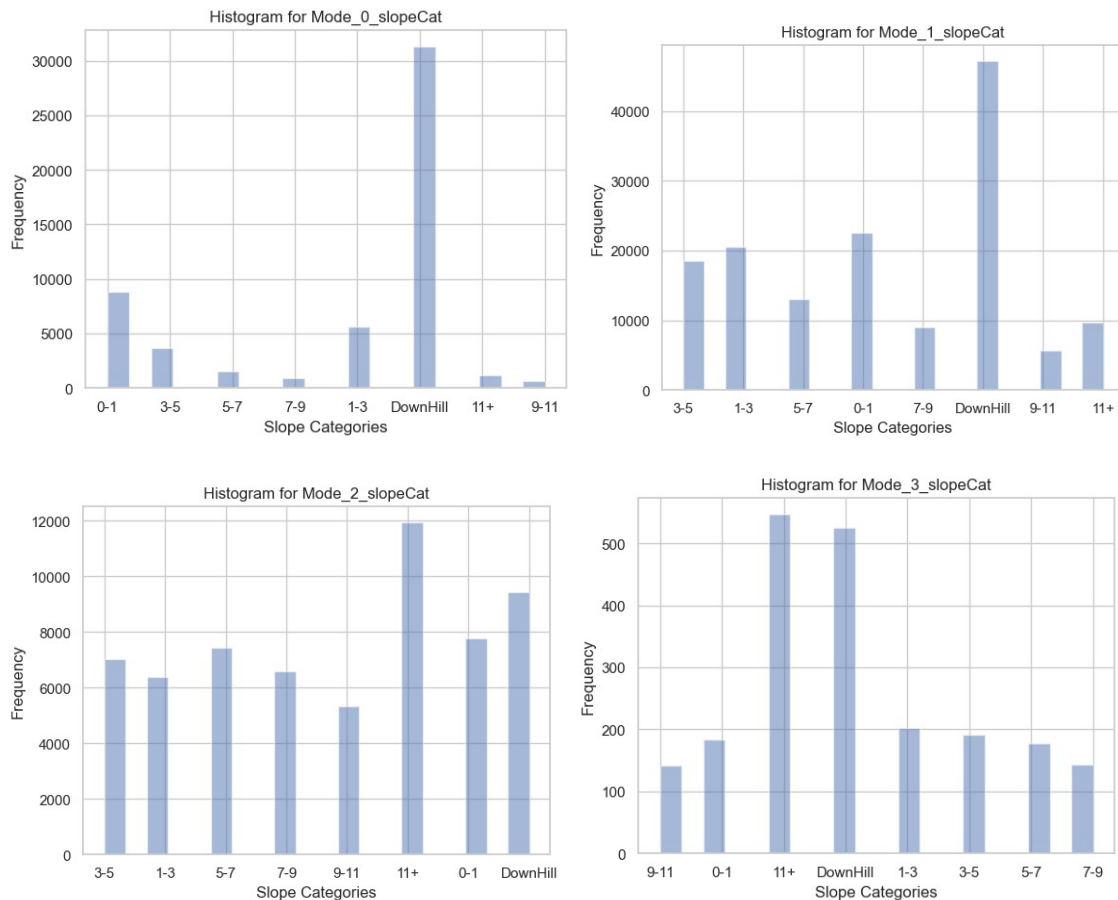
Now let's examine the statistical distribution of cyclist (my) power for different slope ranges and the assistance levels established through my theoretical methodology.

Cyclist Power Distribution by Slope Category


```
Average 'power_0-1': 99.47 W
Average 'power_1-3': 100.16 W
Average 'power_3-5': 114.61 W
Average 'power_5-7': 120.04 W
Average 'power_7-9': 123.22 W
Average 'power_9-11': 123.35 W
Average 'power_11+': 123.98 W
Average 'power_DownHill': 39.19 W
```

So, to tackle a slope of 5 to 7%, the cyclist delivers approximately 120 W, and the TQ motor helps with 74 W, for this analysis case.

To conclude the correlation of all these results with the defined theoretical values, let's look at this set of graphs that display the occurrence of the use of each assistance level (mode) based on terrain slope ranges:

Histogram for Mode_0_slopeCat

Histogram for Mode_1_slopeCat

Histogram for Mode_2_slopeCat

Histogram for Mode_3_slopeCat

We observe, for example, that I do not require assistance (mode_0) for slopes from 0 to 5% and during descents.

The ECO assistance level (mode_1) has been sufficient even on slopes of 9% and higher, possibly for short durations. But mainly up to 7%.

The MID assistance level (mode_2) has been mainly used on slopes 5 to 11%, possibly on ascents of long duration. And +11% short duration.

The HIGH assistance level (mode_3 Clearly used on slopes of more than 11%.

Finally, but not less important, let's examine some results that indicate the occurrence of the use of each assistance level for this total of 27 rides:

```
Occurrences of each value in 'ebike_mode' column:
ebike_mode
1     146096
2      61942
0      53586
3       2113
```

In other words, for this sample of 27 rides, I have used the High level only 0.8%, Eco 55%, Mid 23%, and the rest without assistance.

**** This draft document will be completed with additional analyses and comments. ***